

AN OVERVIEW OF SYNCRUDE'S CURRENT LAND RECLAMATION PROGRAMS

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ABSTRACT

Syncrude Canada Ltd. is an oil sands surface mining and processing venture located at the Athabasca Oil Sands deposit in northeastern Alberta. The Alberta Government maintains that mined land be reclaimed to an acceptable end land use with a capability "equal to or better than" that which was present prior to mining. This paper presents an overview of Syncrude's current land reclamation activities. During 1990, 48 hectares of land were capped with reclamation material to depths varying from 30 cm to 100 cm. A total of 178,000 locally grown indigenous tree seedlings were produced and 98,000 seedlings are planted on the capping materials. In addition, 11 reclamation research projects and 4 reclamation monitoring projects are in progress. The accumulated knowledge gained from these projects will lead to more cost-effective strategies and techniques of land reclamation.

INTRODUCTION

The Syncrude oil sands plant began production in 1978 and currently produces some 60 million barrels of synthetic crude oil per year. The plant, a joint venture of seven oil companies and the Alberta government, is a major contributor towards Canadian energy self-sufficiency.

The Syncrude project will disturb over 19,000 hectares of land under currently approved operations. Syncrude complies with requirements of the Alberta Land Surface Conservation and Reclamation Act to reclaim disturbed lands to acceptable end land uses either for forestry, wildlife, or recreation purposes. This paper presents an overview of Syncrude's current land reclamation activities. The two major land surfaces presently being reclaimed are the overburden disposal piles and the tailings sand dykes.

SOIL SALVAGE AND PLACEMENT

Soil salvage activities consist of the selective removal of muskeg and suitable overburden material for direct hauling and placement on reclamation sites. Muskeg deposits greater than a 2-m deep are also salvaged for soil amendment. Reclamation material is identified by test pit sampling and soil analyses.

During 1990, the S-4 overburden disposal site (35 hectares) and Coke Cell 4 (8 hectares) were capped with at least 1 m of reclamation material. In addition, 5 hectares on Cell 5 Toe Berm were capped with reclamation material transported from *in situ* deposits in the northwest mine quadrant. The latter site is an experimental plot in which the effect of capping depths, varying from 30 cm to 70 cm, on seedling growth will be investigated.

SITE PREPARATION AND SEEDING

Reclamation site surface preparation occurred in May and consisted of levelling, aerial fertilizing, and incorporation using a heavy duty offset disc and a Rome Disc Bedder and Ridger.

The revegetation program in 1990 was for temporary reclamation of the side slopes of Coke Cell 4 and permanent reclamation of the side slopes of S-4 overburden disposal site. Seeding of the temporary site was done in June using a Rangeland seed drill. The seed mixture contained 55% alfalfa, 37% bird's-foot trefoil, and 8% timothy. Seeding on the slope area of S-4 was carried out in late May with a nursing crop of barley and oats. Revegetation using the nursing crop is mainly for the purpose of wind and water erosion control.

GREENHOUSE OPERATIONS

Seedling rearing in Syncrude's greenhouse generally commences in March each year with the seeding of a spring crop. A second crop is seeded in June once the first crop has been removed to an adjoining shadehouse. This shadehouse is fully supported by irrigation and fertilization facilities. Table 1 presents the greenhouse production of seedlings in 1990.

Table 1: 1990 greenhouse production of seedlings.

SPECIES	NUMBER	DATE SOWN	CONTAINER SIZE (ml)
Jackpine	31,000	March	750
Siberian Larch	31,000	March	750
Jackpine	97,000	June	350
Red osier dogwood	4,000	June	350
Trembling aspen	15,000	June	350

TREE PLANTING

A total of 98,000 tree seedlings will have been planted on 49 hectares by October 1990, as indicated by Table 2. Generally, jackpine or a mixture of jackpine and dogwood will be planted on south and west-facing slopes while north and east-facing slopes will be reforested with a white spruce/aspen mixed wood. Siberian larch are being assessed for suitability on reclamation sites. Syncrude plants tree seedlings in densities sufficient to meet provincial stocking standards for regeneration.

RECLAMATION RESEARCH AND MONITORING

The objective of the Syncrude land reclamation research program is to identify and develop cost-effective land reclamation strategies and techniques to achieve acceptable reclamation during the Syncrude development. This program has been ongoing since 1975. An ongoing monitoring program is aimed at the documentation of changes and trends within the reclaimed environment for comparison against biological and regulatory standards.

Current land reclamation research program consists of 9 in-house projects and 2 government/industry joint projects. Table 3 indicates current research projects and their status. These projects can be organized into three categories: soil reconstruction, woody plant establishment, and ecosystem redevelopment. The soil

Table 2: 1990 tree planting plan.

SITE	AREA (ha)	SPECIES	CROP NO.	DENSITY (stem/ha)	TOTAL SEEDLINGS
S-4 Overburden Disposal Site	35	Jackpine	88-1	2,000	30,000
		White Spruce	88-2	2,000	25,000
		Siberian larch	90-1	2,000	15,000
Cell 5, Toe Berm (RRTAC plots)	5	Jackpine	90-1	500	2,500
		White spruce	88-2	500	2,500
		Trembling aspen	90-2	500	2,500
		Red osier dogwood	90-2	500	2,500
S-1 Overburden Disposal Site	9	Jackpine	90-1	2,000	18,000

Table 3: Status of current land reclamation research project.

PROJECT NAME	CURRENT STATUS
<u>Soil Reconstruction</u>	
Overburden characterization for reclamation suitability	- Drilling samples for long term planning - Correlation with geological data
Oil sands tailings soil reconstruction	- RRTAC/Industry project - Final summary report preparation
Capping depths for tailings sand	- RRTAC/Syncrude project - Newly set-up and tree planting in fall
Biological dewatering of oil sand sludge	- Preliminary results
<u>Woody Plant Establishment</u>	
Planting time	- Data collection and analysis - Preliminary results
Performance of large vs small seedling stock on revegetated sites	- Data collection and analysis - Report preparation
Effect of nurse crop on seedling establishment	- Data collection and analysis - Report preparation
Meadow vole abundance and rodent damage on reforestation sites	- Data collection and analysis - Interpreted results
Seedling protection with "Vexar" cylinders	- Continued seedling establishment - Preliminary results
Performance of damaged seedlings	- Data collection and analysis - Interpreted results
<u>Ecosystem Redevelopment</u>	
Native species invasion survey	- Data collection and analysis - Preliminary results

reconstruction projects are designed to evaluate available methods of soil reconstruction and develop appropriate operational methods. There are 4 projects under this category. The objectives of woody plant establishment projects are to develop and evaluate methods of optimizing woody plant establishment. There are 6 projects belonging to this category. The objective of ecosystem redevelopment is to document succession rates in reclaimed areas. Currently one such project is ongoing.

There are 4 land reclamation monitoring projects. Table 4 indicates current monitoring sites for species, biomass, seedling survival, blown tailings sand, and vegetation re-establishment.

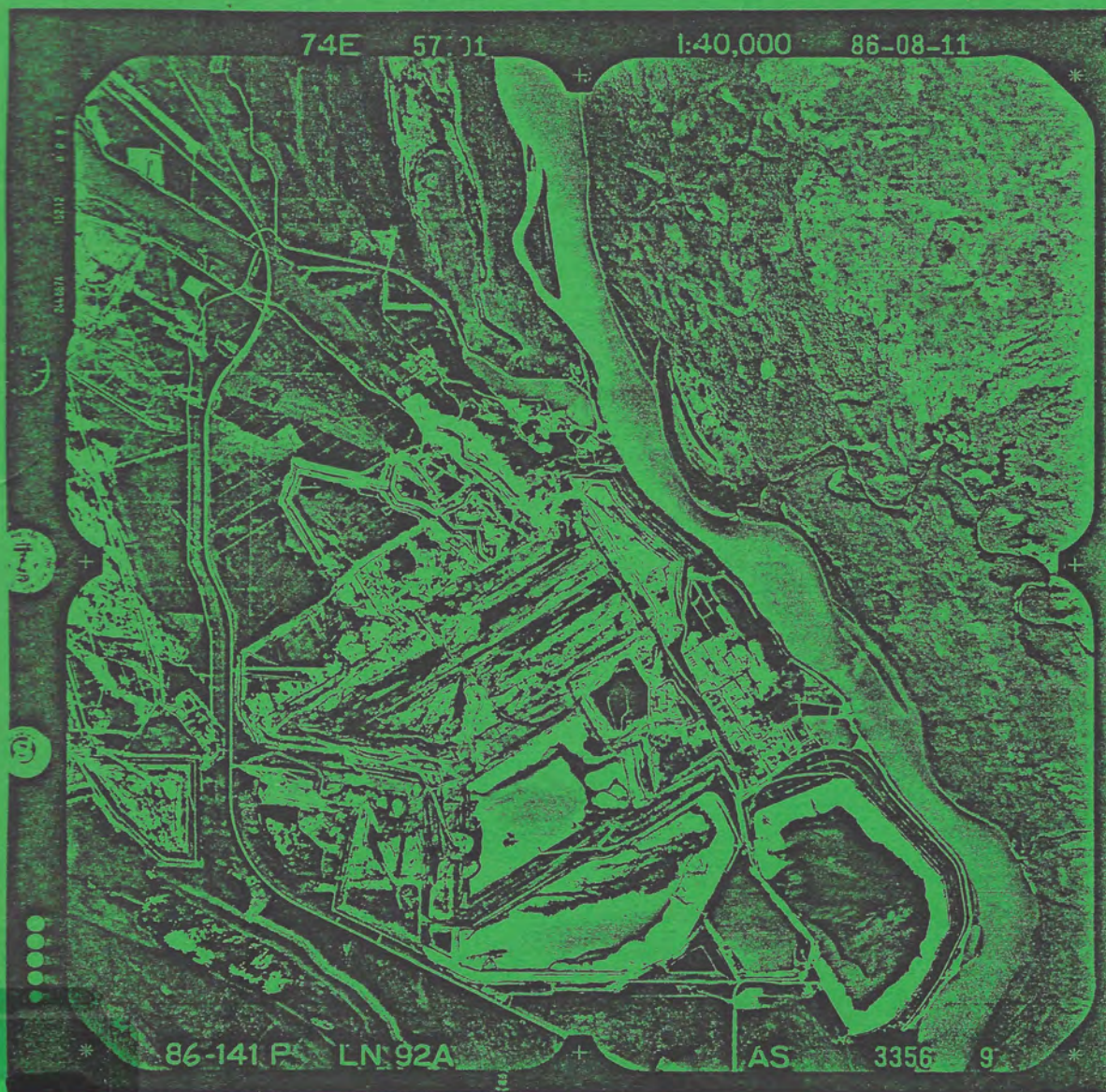
The results of the land reclamation research and monitoring program have provided, and will continue to provide, a better understanding of the various soil materials in the Mildred Lake project area and the plant species to be used for reclamation. This accumulated knowledge will lead to more cost-effective strategies and techniques of land reclamation.

Table 4: Status of current land reclamation monitoring projects

PROJECT NAME	CURRENT STATUS
Revegetation species and biomass monitoring	- 35 monitoring plots being assessed annually
Woody Seedling plantation survival	- One and five-year survival of plantations being assessed
Wind blown tailings sand source and control	- Periodic assessment
Beaver Creek Diversion system vegetation re-establishment	- Reconnaissance survey

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Front Cover: 1986 airphoto of the Suncor facility, north of Fort McMurray, Alberta.

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DEDICATION

These proceedings are dedicated to the memory of Bruce Runge and Michael Mensforth. These two reclamationists passed away in the fall of 1990 while on the job.

Bruce Runge worked for Western Oilfield Environmental Services Ltd. as Operations Manager and was on his way to conduct a pipeline inspection in the Primrose Lake area when the helicopter he was in crashed on the outskirts of Edmonton. Bruce was 45 years old.

Michael Mensforth worked as a reclamation technologist for Alberta Environment, Land Reclamation Division and was on his way to a site in northern Alberta when he was killed in a freak vehicle accident. Micheal was 35 years old.

The loss of these two specialists is a blow to the small reclamation community of our province. It also points out to the rest of us that ours can be a dangerous profession and that safety is critical in our business.

SPONSORS

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